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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 09/778,306 | 02/06/2001 | Behrouz Farhang-Boroujeni | 21046.P004 | 5649 |

7590 07/13/2004

Lawrence N. Ginsberg
907 Citrus Place
Newport Beach, CA 92660

| EXAMINER | |
|---|---|
| NGUYEN, DUNG X | |
| ART UNIT | PAPER NUMBER |
| 2631 | |

DATE MAILED: 07/13/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/778,306 | FARHANG-BOROUJENI ET AL. | |
| | Examiner | Art Unit | |
| | Dung X Nguyen | 2631 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1 - 41* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *1 - 15 and 25 - 41* is/are allowed.

6)☒ Claim(s) *16, 18, and 20 - 24* is/are rejected.

7)☒ Claim(s) *17 and 19* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 February 2001* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## *DETAILED ACTION*

### *Drawings*

1. The drawings are objected to because:

On figure 3, blocks 102, 104, 106, 108, 114, 116, 118, and 120 must use descriptive language to identify each of such blocks.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> *(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.*

3. **Claims 16, 18 are rejected** under 35 U.S.C. 103(a) as being unpatentable over Jones et al. (US patent # 6,128,351), in view of Komatsu (US patent # 6,144,860).

Regarding claim 16, Jones et al. et al. discloses:

- an input data for receiving a known data signal (column 1, lines 53 – 54);
- an input data for receiving an unknown data signal (column 1, lines 51 – 52);

- a data combiner to produce the composite output signal having discrete data signals, wherein each discrete data signal comprising at least a portion of unknown data (column 1, line 61) and at least a portion of the known data signal (column 1, line 68).

While Komatsu discloses a signal power ratio input for receiving a power ratio signal indicating a ratio combining the unknown data signal and the known data signal (column 3, lines 18 – 32).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Jones et al. and Komatsu to improve the communication system.

Regarding claim 18, Jones et al. further inherently discloses that combiner is a frequency domain data combiner (column 1, lines 22 – 23. As the combiner for receiving OFDM modulated signals, it must be a frequency domain data combiner).

4. **Claims 20 – 24 are rejected** under 35 U.S.C. 103(a) as being unpatentable over Jones et al. (US patent # 6,128,351), Komatsu (US patent # 6,144,860), further in view of figure 1 admitted as a prior art by applicant.

Regarding claims 20 and 21, respectively, as followed by the limitations analyzed in claim 16, Jones et al. and Komatsu differ from the instant claimed invention that they do not show the step of comprising a serial to parallel converter having a plurality of outputs.

However, figure 1 admitted as a prior art by applicant discloses the serial to parallel converter (102) to provide a plurality of outputs.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to combine Jones et al., Komatsu, and figure 1 admitted as a prior art by applicant to improve the communication system.

Regarding claim 22 and 23, respectively, as followed by the limitations analyzed in claim 21, figure 1 admitted as a prior art by applicant further discloses an inverse discrete Fourier transform module (104).

Regarding claim 24, as followed by the limitations analyzed in claim 23, figure 1 admitted as a prior art by applicant further discloses a cyclic prefix adder (108).

***Allowable Subject Matter***

5. **Claims 17 and 19 are objected** to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. **Claims 1 – 15 and 25 – 41 are allowed.** The following is a statement of reasons for the indication of allowable subject matter:

Regarding to the claimed inventions, the prior art of record fails to show or render obvious of a multi-carrier communication system, comprising:

A transmission unit comprising:

- A data input for receiving an unknown data signal;
- A data input for receiving a know data signal;
- A power ratio signal input for receiving a power ratio signal indicating a ratio for combining unknown data and known data signals; and
- A data combiner coupled to the data input for combining the unknown and known data signals in accordance with the power ratio signal to produce a composite signal comprising discrete data signals, wherein each discrete data signal comprises at least a portion of the unknown data signal and at least a

portion of the known data combined in accordance with the power ratio signal. It also has an output adapted to provide the composite output signal to a multi-carrier transmitter transmitted a transmit signal on a communication channel, wherein the transmit signal includes the composite signal; and

A receiving unit comprising:

- A multi-carrier receiver for receiving the transmitted signal on the communication channel, having an output for providing a corresponding composite signal, wherein the composite signal comprises corresponding discrete data signals and is shaped by at least one signal shaping characteristic of the communication channel;
- A channel estimator having a known data input, an input coupled to receive the corresponding composite signal, an input coupled to receive the power ratio signal, and an input for receiving at least one estimate of the characteristic of the unknown data signal, estimating the at least one signal shaping characteristic of the communication channel from at least the corresponding composite signal, the at least portion of the known data signal and the at least one estimate of the unknown data signal. The channel estimator has also an output for providing at least one estimated communication channel characterizing signal; and
- An equalizer coupled to receive the corresponding signal, the known data signal, the power ratio signal, and the at least one estimated communication channel characterizing signal, configures at least one of its signal shaping characteristics to compensate for the at least one signal shaping characteristic of the communication channel, shapes the corresponding composite signal accordingly. The equalizer also has an output for providing at least subsequent estimate of the unknown data signal.

***Conclusion***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

*US Patent Documents:*

Barton et al. (US patent # 6,654,431 B1) discloses a multi-carrier personal access communication system.

Maloney et al. (US patent # 6,546,256 B1) discloses robust, efficient, location-related measurement.

Barton et al. (US patent # 6,449,246 B1) discloses a multi-carrier personal access communication system.

Jones et al. (US patent # 6,307,892 B1) discloses a multi-carrier communication system and its corresponding method for peak power control.

Humphrey et al. (US patent # 6,130,918) discloses a method and its corresponding apparatus for reducing the peak-to-average ration in a multicarrier communication system.

Bäuml et al. (US patent # 6,130,918) discloses a method and its corresponding apparatus for reducing the crest factor in digital transmission procedures.

Bottomley et al. (US patent # 5,909,465) discloses a method and its corresponding apparatus for bi-directional demodulation of digitally modulated signals.

Sakoda et al. (US patent # 5,907,583) discloses a transmitting/receiving apparatus and communicating method.

Van Nee (US patent # 5,841,813) discloses a digital communication system using complementary codes and amplitude modulation.

*Other Publications:*

Miolisavljevic et al., "Fixed Point Algorithm for Bit Rate Optimal Equalization in Multicarrier Systems", IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 1999, vol. 5, 15 – 19 March 1999, pp. 2515 – 2518.

Wang et al., "Joint Channel Estimation and Equalization in Multicarrier Modulation System Using Cyclic Prefix", IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 1999, vol. 5, 15 – 19 March 1999, pp. 2733 – 2736.

***Contact Information***

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dung X. Nguyen whose telephone number is (703) 305-4892. The examiner can normally be reached on Monday through Friday from 8:30 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Ghayour Mohammad H. can be reached on (703) 306-3034. The fax phone numbers for this group is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3800.

DXN
June 15, 2004

JEAN B. CORRIELUS
PRIMARY EXAMINER
7/7/04